A Total Maximum Daily Load Implementation Plan for Dumps Creek

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EXECUTIVE SUMMARY

Dumps Creek is located in Russell County, Virginia, northwest of the town of Cleveland and close to the Appalachian Power Plant that discharges to Clinch River. The watershed lies within the basin designated by USGS hydrologic unit code 06010205 and carries an agency watershed ID of VAS-P08R. Dumps Creek flows into the Clinch River, which is part of the Tennessee/Big Sandy River Drainage Basin. The Clinch River watershed is the number one hotspot in the U.S. for imperiled aquatic species, which emphasizes the need to maintain good water quality in the creek.

When streams fail to meet standards, the stream is listed as impaired on the CWA's Section 303(d) list. Dumps Creek was first listed as impaired in 1994 due to violations of the State's General Standard (benthic). It appeared on Virginia's *1996 303(d) TMDL Priority List* (VADEQ, 1997) and the *1998 303(d) Total Maximum Daily Load Priority List and Report* (VADEQ, 1998) for Aquatic Life Use – Partially Supporting. The impairment source noted was resource extraction. The impaired stream segment, initially identified as having a length of 3.40 miles, extends from the Hurricane Fork confluence to the mouth where Dumps Creek flows into Clinch River in Carbo, VA.

As a result of the listings and court actions taken against the United States Environmental Protection Agency (EPA), total maximum daily load (TMDL) reports were developed (*General Standard Total Maximum Daily Load Development for Dumps Creek, Russell County, Virginia*, MapTech, Inc., March 2003) which established the reduction in loads needed to restore these waters. Virginia law requires that a plan be developed to achieve fully supporting status for impaired waters. In fulfilling the state's requirement for the development of a TMDL Implementation Plan (IP), a framework was established for reducing fecal bacteria levels to achieve the water quality goals for the impaired streams.

Review of TMDL Development

MapTech, Inc. was contracted by the VADEQ to develop a TMDL for the Dumps Creek watershed in Russell County, Virginia. The EPA-approved TMDL document can be obtained at http://gisweb.deq.virginia.gov/tmdlapp/tmdl_report_search.cfm. During development of the

TMDL, Total Suspended Solids (TSS/sediment) and Total Dissolved Solids (TDS) were identified as the primary stressors to aquatic life.

The land area of the Dumps Creek Watershed is approximately 20,300 acres, with forest and mining as the primary land uses. Approximate proportions of specific land uses as of 1997 were 71% forest, 26% either permitted for mining operations (highly transitional area, including various amounts of forest, active mining, and reclaimed areas depending on the timeframe considered) or previously mined, 1% agriculture, 1% water/wetlands and 1% urban/industrial development.

Water quality monitoring conducted during the TMDL study confirmed the impairment and its association with TSS and TDS. The Dumps Creek TMDL was unusual among Virginia's General Standard TMDLs, in that the approach was to use a bioassessment model to relate in-stream water quality to the health of the aquatic community. Through this approach, interactions of multiple stressors were considered, and allocations were based on attaining a non-impaired condition of the aquatic community.

The Hydrologic Simulation Program FORTRAN (HSPF) water quality model was used as the modeling framework to simulate hydrology and the transport of water quality constituents (*e.g.*, TDS and TSS) to the stream. A sensitivity analysis was performed to determine which stressor reductions were most effective in improving the bioassessment condition. The bioassessment condition was found to be most sensitive to reductions in TSS and TDS. Multiple runs were performed to investigate the reductions necessary to achieve a non-impaired status. Table E.1 shows some of the scenarios investigated including the final allocation scenario (Scenario C).

The major implication in the development of these TMDLs is that moderate reductions in TSS and TDS are required to achieve the water quality standard. No reductions to existing loads from permitted discharges were indicated. However, there are subtler implications as well. Implicit in the lack of reduction in the permitted discharges is the need to maintain loads at or below existing conditions. Any increase in this waste load would have to be offset by reductions elsewhere in the watershed.

Table E.1 Average bioassessment score for various allocation scenarios in the Dumps Creek impairment.

Scenario Description	Average Bioassessment	Impairment Condition
Existing conditions	73%	Moderately Impaired
Scenario A: 50% of TSS from nonpoint sources	80%	Moderately Impaired
Scenario B: 50% of TSS from nonpoint sources 20% of TDS from nonpoint sources	85%	Non-Impaired
Scenario C: 40% of TSS from nonpoint sources 34% of TDS from nonpoint sources	85%	Non-Impaired

Public Participation

The actions and commitments described in this document are drawn together through input from citizens of the watershed, Russell County governments, Virginia Department of Environmental Quality (VADEQ), Virginia Department of Conservation and Recreation (VADCR), Virginia Department of Forestry (VDOF), Department of Mines, Minerals, and Energy (DMME), Virginia Cooperative Extension (VCE), Natural Resources Conservation Service (NRCS), the Clinch Valley Soil and Water Conservation District (CVSWCD), coal company representatives, MapTech, Inc, and other organizations. Every citizen and interested party in the watershed is encouraged to become involved in implementing the IP to help restore the health of the streams.

Public meetings were conducted to distribute information, gain feedback, and solicit participation in the smaller forums. Working groups were assembled, consisting of stakeholders with similar concerns (*e.g.,* industrial, environmental, and governmental). Representatives from each working group participated in the Steering Committee, where input from the working groups was reviewed and decisions about the IP were made. Throughout the public participation process, major emphasis was placed on discussing best management practices (BMPs), BMP specifications, locations of control measures, education, technical assistance, and funding.

Many inputs and opinions were voiced throughout the public participation meetings regarding the IP process. Most members of the working groups agreed that the IP should focus on targeting resources toward reclamation of the most obvious AML features, such as the Hurricane

Fork gob pile. This work should be combined with education, regarding the placement and maintenance of gas wells, as well as proper installation and maintenance of both mining and forestry BMPs. Additional work would include efforts to identify additional AML features and funding mechanisms for reclaiming them.

Assessment of Implementation Action Needs

Potential control measures, their associated costs and efficiencies, and potential funding sources were identified through input from Working Groups, and literature review. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts. The quantity of control measures required during implementation was determined through spatial analyses, modeling alternative implementation scenarios, and working group member requests. Spatial analyses included the processing of data that included land use, stream networks, and elevation, along with data archived from the TMDL development documents. The map layers and archived data were combined to establish the number of control measures required. The quantities of control measures were determined through modeling alternative scenarios and applying the related reduction efficiencies to their associated loads. The final set of control measures identified and the estimated needs are listed in Table E.2.

Table E.2 Control Measures required to meet the Dumps Creek TMDL.

Control Measure	Units	Installed	Needed
Reclamation of Abandoned Mine Land	Acre	0	273
Dirt Road Stabilization	Acre	1	123
Vegetated Buffer	Acre	11	5
Streambank Stabilization	Feet	2,500	2,640

Cost/Benefit Analysis

Implementation costs were determined through review of available literature and discussion with stakeholders. The estimated cost of implementing all control measures in the Dumps Creek watershed is $3.35 million. The cost of each of the control measures selected for this IP is highly variable, depending on the specific conditions where the control measure is implemented. The costs listed in this document are anticipated average costs that are the best estimates available at

this time. It was determined by the Working Group and Steering Committee members that much of the educational work to support implementation could be accomplished by existing agency personnel through the course of their normal activities. The additional work could be accomplished by a VISTA volunteer. Based on Working Group input, it would require $3,000 to support one VISTA volunteer for a year. With an anticipated 5-year period, the total potential cost to provide technical assistance during implementation is expected to be $15,000 total for 5 years.

The primary benefit of implementation is cleaner waters in Virginia. Specifically, the aquatic community in this stream will be restored. In addition to allowing the aquatic community to thrive, the control measures that will be implemented to control sediment and TDS will also serve to reduce delivery of other pollutants to the stream from upland locations. Many of the BMPs intended to reduce soil and TDS losses should increase infiltration of precipitation, decreasing peak flows downstream.

Measurable Goals and Milestones for Attaining Water Quality Standards

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures first. For instance, it is anticipated that the greatest water quality benefit will be gained through remediation of the most obvious AML features (*e.g.*, the Hurricane Fork gob pile). This IP has been laid out as a two stage process, where the focus during Stage I is on identification and reclamation of AML features and haul road stabilization, but the efforts expand to include streambank stabilization and vegetated buffers in Stage II. The two five-year implementation stages will be followed by five years of water quality monitoring.

Implicit in the process of a staged implementation is targeting of control measures: this ensures optimum utilization of resources. In the case of Dumps Creek, the most obvious AML features have been identified and remediation of these sites is being pursued. As additional AML features are identified, efforts should be made to prioritize their remediation based on proximity to the stream and the degree of disturbance.

Stakeholders and their Role in Implementation

Stakeholders are individuals or entities who live or have land management responsibilities in the watershed, including private individuals, businesses, government agencies, and special interest groups. Stakeholder participation and support is essential for achieving the goals of this effort (*i.e.*, improving water quality and removing streams from the impaired waters list). Personnel within DMME's Division of Mine Land Reclamation (DMLR) will have the key role in promoting and tracking implementation. VADCR and VADEQ personnel will provide literature describing the TMDL needs and goals for Dumps Creek. This literature will be provided to operators in the watershed through DMME's Division of Gas and Oil (DGO), DMLR, and VDOF. Additionally, CVSWCD has agreed to house a VISTA volunteer in their offices, who will have the responsibility to help coordinate efforts between agencies and to review aerial photography and watershed maps in an effort to identify additional AML features.

1. INTRODUCTION

In this section a general description of the project background is presented, followed by a review of the applicable state water quality standards, and a discussion of the project methodology.

1.1 Background

Clean water is essential to all forms of life: human, plant, and animal. In cases where water has been impacted by non-native constituents (*e.g.*, dissolved and suspended solids), the adverse effects must be noted and counteracted.

This Implementation Plan (IP) and the Total Maximum Daily Load (TMDL) that it supports is based on Virginia's General Standard, which is assessed through analysis of the health of aquatic life. The General Standard is meant both to protect the health of aquatic life, and to serve as a fallback monitoring program to identify problems that are not detected by the ambient monitoring system (*e.g.*, pollutant discharges that are intermittent in occurrence, isolated incidents of pollutant discharge, and discharge of pollutants that are not normally measured through the ambient monitoring system). The health of the aquatic life is measured through assessment of the benthic macroinvertebrate (benthic) community, which is integral to the food chain that supports higher-level organisms. An unhealthy aquatic community will impact local and downstream fisheries. Additionally, an aquatic community that is already impacted will not be a good indicator of pollutant problems in the stream.

As for the specific pollutants that were addressed by the General Standard TMDL for Dumps Creek (Total Dissolved Solids – TDS, and Total Suspended Solids – TSS), they have relevance for downstream water bodies as well as for Dumps Creek. Specifically, Dumps Creek is a tributary of the Clinch River. According to the Nature Conservancy (2007), the Clinch and Powell Rivers are considered the only ecologically intact (undammed) headwaters of the Tennessee River system. The Clinch River watershed is the number one hotspot in the U.S. for imperiled aquatic species. Combined with the rare plants, mammals, birds, and insects that live in the watershed, the Clinch Valley and its rivers support 30 federally listed threatened or endangered species.

The Clean Water Act (CWA) that became law in 1972 requires that all U.S. streams, rivers, and lakes meet certain water quality standards. The CWA also requires that states conduct monitoring to identify waters that are polluted and/or do not meet standards. Through this required program, the state of Virginia has found that many stream segments do not meet state water quality standards for protection of the five beneficial uses: fishing, swimming, shellfish, aquatic life (benthic), and drinking.

When streams fail to meet standards, the stream is listed as impaired on the CWA's Section 303(d) list. Dumps Creek was first identified as impaired in 1994 due to violations of the State's General Standard (benthic). It appeared on Virginia's *1996 303(d) TMDL Priority List* (VADEQ, 1997) and the *1998 303(d) Total Maximum Daily Load Priority List and Report* (VADEQ, 1998) for Aquatic Life Use – Partially Supporting. The impairment source noted was resource extraction. The impaired stream segment, initially identified as having a length of 3.40 miles, extends from the Hurricane Fork confluence to the mouth where Dumps Creek flows into Clinch River in Carbo, VA.

In the *2002 Report on Impaired Waters*, the impaired segment of Dumps Creek was resized to 3.42 miles (Figure 1.1); two biological monitoring stations were determined to be 'moderately impaired'. Under the "Impairment Source" heading, the area's history of coal mining activities was noted. Dumps Creek was once again listed as impaired with regard to the General Standard (benthic) on the *2004 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report*. This report also notes that a draft TMDL report attributes sedimentation to the benthic impairment.

Dumps Creek is located in Russell County, Virginia, northwest of the town of Cleveland and close to the Appalachian Power Plant that discharges to Clinch River (Figure 1.2). It flows into the Clinch River, which is part of the Tennessee/Big Sandy River Drainage Basin, and drains via the Mississippi River to the Gulf of Mexico. Dumps Creek is located within USGS hydrologic unit code 06010205 and carries an agency watershed ID of VAS-P08R.

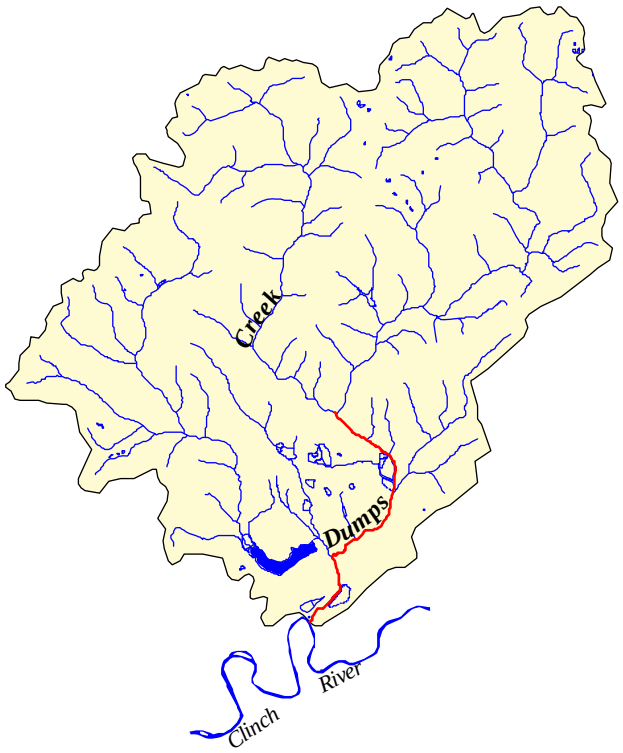

Figure 1.1 The impaired stream segment in the Dumps Creek watershed.

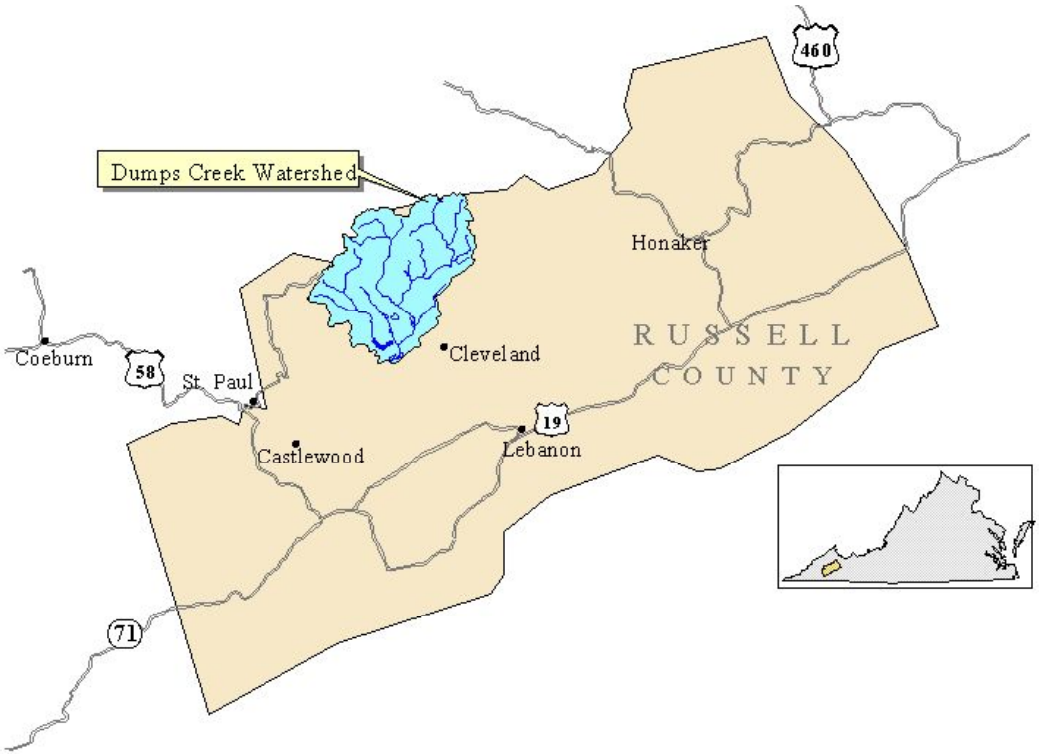

Figure 1.2 Location of the Dumps Creek watershed.

The land area of the Dumps Creek Watershed is approximately 20,300 acres, with forest and mining as the primary land uses (Figure 1.3, Table 1.1). Approximate proportions of specific land uses as of 1997 were 71% forest, 14% permitted for mining operations (highly transitional area, including various amounts of forest, active mining, and reclaimed areas depending on the timeframe considered), 4% benches (abandoned surface mine sites leaving exposed high walls), 4% spoils/tailings (mine waste discarded in fills, ponds, or piles), 3% reclaimed mine lands, 1% disturbed lands (areas disturbed by previous mining operations through removal of vegetation and/or grading), 1% agriculture, 1% water/wetlands and 1% urban/industrial development.

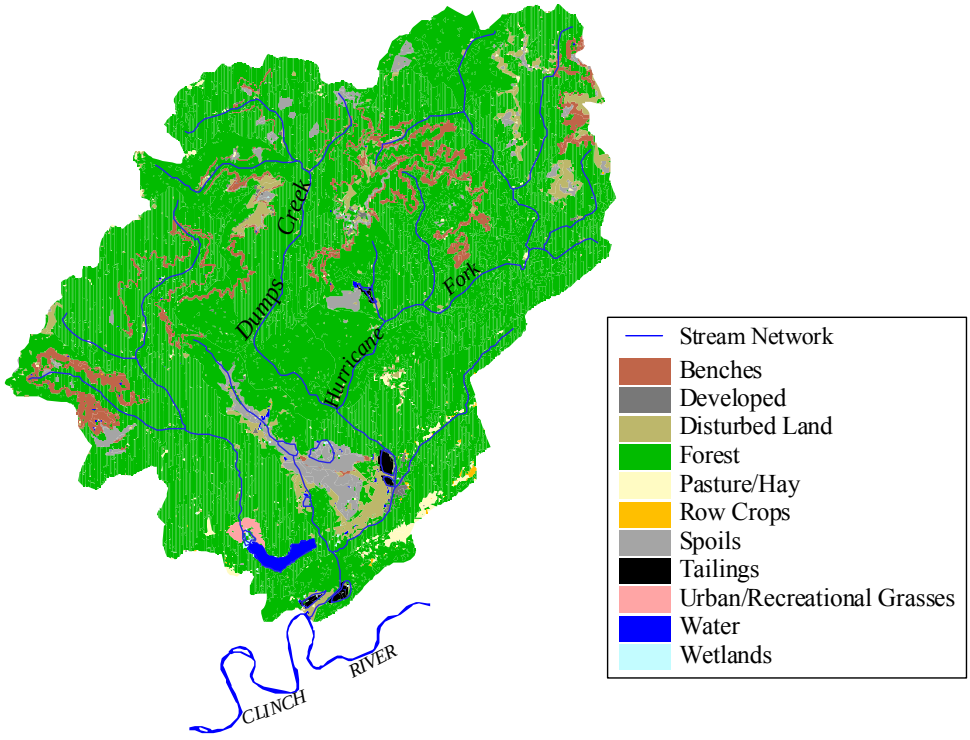

Figure 1.3 Land uses in the Dumps Creek watershed.

Table 1.1 Spatial distribution of land use in the Dumps Creek drainage area.

Land Use	Acreage
Active Mining	942
AML-Benches	870
AML-Disturbed	293
Developed	54
Forest	15,679
Pasture/Hay	210
Reclaimed	1,412
Spoils	494
Tailings	68
Urban/Recreational Grasses	120
Water	157

For the period from 1955 to 2005, station 449215 at Wise, Virginia received average annual precipitation of approximately 47.1 inches, with 51% of the precipitation occurring during the May to October growing season (SERCC, 2006). Average annual snowfall is 46.3 inches with the highest snowfall occurring during January (SERCC, 2006). Average annual daily temperature is 53.1 °F. The highest average daily temperature of 80.9 °F occurs in July, while the lowest average daily temperature of 23.5 °F occurs in January (SERCC, 2006).

1.2 Applicable Water Quality Regulations

Section 303(d) of the CWA and the U.S. Environmental Protection Agency's (EPA) Water Quality Management and Planning Regulation (40 CFR Part 130) both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a stream. That is, it sets limits on the amount of pollution that a stream can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. A TMDL accounts for seasonal variations and must include a margin of safety (MOS). Through the TMDL process, states establish water-quality based controls to reduce pollution and meet water quality standards.

Once a TMDL is developed and approved by the State Water Control Board (SWCB) and the EPA, measures must be taken to reduce pollution levels in the stream. The approved TMDL for Dumps Creek can be found on the VADEQ website:

http://gisweb.deq.virginia.gov/tmdlapp/tmdl_report_search.cfm.

Virginia's 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA) states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". The TMDL IP describes control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), to be implemented in a staged process.

In developing this IP, elements from both state and federal guidance were incorporated and the recommendations from Virginia's *Guidance Manual for Total Maximum Daily Load Implementation Plans* (VADCR and VADEQ, 2003) were followed. (Specific state and federal requirements of an IP are described in chapter 2 of this document.) Virginia's 1997 WQMIRA determined that an IP shall include the date of expected achievement of water quality objectives, measurable goals, necessary control measures, and the associated costs, benefits, and environmental impacts of addressing the impairments. The EPA outlines the minimum elements of an approvable IP in its 1999 *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA, 1999). These elements include implementation actions/management measures, timeline, legal or regulatory controls, time required to attain water quality standards, monitoring plan, and milestones for attaining water quality standards. The process of incorporating these state and federal guidelines into an IP consisted of three major components: 1) public participation, 2) identification and assessment of potential control measures, and 3) assessment of progress toward end goals.

Once developed, the Virginia Department of Environmental Quality (VADEQ) will take the TMDL implementation plan to the SWCB for approval as the plan for implementing the pollutant allocations and reductions contained in the TMDL. Also, VADEQ will request SWCB authorization to incorporate the TMDL IP into the appropriate Water Quality Management Plan (WQMP) in accordance with the CWA's Section 303(e). In response to a Memorandum of Understanding (MOU) between EPA and VADEQ, VADEQ also submitted a draft Continuous

Planning Process to EPA in which VADEQ commits to regularly updating the WQMPs. Thus, the WQMPs will be, among other things, the repository for all TMDLs and TMDL implementation plans developed within a river basin.

In fulfilling the state's requirement for the development of a TMDL IP, a framework has been established for reducing TDS and TSS levels and achieving the water quality goals for the Dumps Creek impaired segment for which TMDL allocations were developed.

1.2.1 Designated Uses of Virginia's Waterbodies

As stated in Virginia state law 9 VAC 25-260-10 (Designation of uses),

> *A. All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.*
>
> ◆
>
> *D. At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under §§301(b) and 306 of the Clean Water Act and cost-effective and reasonable best management practices for nonpoint source control.*

1.2.2 Applicable Criterion for Benthic Impairment

The General Standard**,** as defined in Virginia state law 9 VAC 25-260-20, states:

> *A. All state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.*

The General Standard is implemented by VADEQ through application of the modified Rapid Bioassessment Protocol II (RBP II). Using the modified RBP II, the health of the benthic macroinvertebrate community is typically assessed through measurement of eight biometrics (Table 1.2), which evaluate different aspects of the community's overall health. Surveys of the benthic macroinvertebrate community performed by the VADEQ are assessed at the family taxonomic level (Barbour, 1999).

Each biometric measured at a target station is compared to the same biometric measured at a reference (not impaired) station to determine each biometric score. These scores are then summed and used to determine the overall bioassessment (*e.g.,* not impaired, slightly impaired, moderately impaired, or severely impaired).

Table 1.2 Components of the modified RBP II assessment.

Biometric	Benthic Health [1]
Taxa Richness	↑
Modified Family Biotic Index (MFBI)	↓
Scraper to Filtering Collector Ratio (SC/CF)	↑
EPT / Chironomid Ratio (EPT/CHI ABUND)	↑
% Contribution of Dominant Family (% DOM)	↓
EPT Index	↑
Community Loss Index (COMM. LOSS INDEX)	↓
Shredder to Total Ratio (SH/TOT)	↑

[1] An upward arrow indicates a positive response in benthic health when the associated biometric increases.

1.3 Project Methodology

The overall goal of this project was to begin the process of restoring water quality to Dumps Creek. The key components of the staged IP are discussed in detail in the following sections: State and Federal Requirements for Implementation Plans, Review of TMDL Development, Public Participation, Assessment of Implementation Action Needs, Measurable Goals and Milestones for Attaining Water Quality Standards, and Stakeholders and Their Role in Implementation.

With successful completion of the IP, Virginia will be well on the way to restoring this impaired water body and enhancing the value of this important resource. Additionally, development of an approved IP will improve the localities' chances for obtaining monetary assistance during implementation.

2. STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS

The goal of this chapter is to clearly define the state and federal requirements and recommendations for TMDL IPs. This chapter has three sections that discuss the following: the requirements outlined by the WQMIRA that must be met in order to produce an IP that is acceptable and approvable by the Commonwealth, the EPA-recommended elements of IPs, and the required components of an IP in accordance with Section 319 guidance. The IP is intended to include both the required and recommended elements described in this chapter.

2.1 State Requirements

The TMDL IP is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or WQMIRA. The WQMIRA directs VADEQ to "develop and implement a plan to achieve fully supporting status for impaired waters." In order for IPs to be approved by the Commonwealth, they must meet the requirements as outlined by the WQMIRA. WQMIRA requires that IPs include the following:

- Date of expected achievement of water quality objectives,
- Measurable goals,
- Corrective actions necessary,
- Associated costs, benefits, and environmental impacts of addressing the impairment, and
- Expeditious development and implementation of TMDLs when appropriate.

2.2 Federal Recommendations

Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. The EPA does, however, outline the minimum elements of an approvable IP in its "Guidance for Water Quality-Based Decisions: The TMDL Process" (EPA, 1999). The listed elements include:

- a description of the implementation actions and management measures,
- a timeline for implementing these measures,
- legal or regulatory controls,
- the time required to attain water quality standards, and
- a monitoring plan and milestones for attaining water quality standards.

It is strongly suggested that the EPA recommendations be addressed in the IP, in addition to the required components as described by WQMIRA.

2.3 Requirements for Section 319 Fund Eligibility

The EPA develops guidelines that describe the process and criteria used to award CWA Section 319 nonpoint source grants to states. While Section 319 funds are not guaranteed to areas with approved implementation plans, the guidelines set forth by the Section 319 program are useful for ensuring a complete and thorough plan. The "Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003" identifies the following nine processes that must be reflected in the IP in order to meet the 319 requirements:

- Identify the causes and sources of groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan.
- Estimate the load reductions expected to achieve water quality standards.
- Describe the nonpoint (NPS) management measures that will need to be implemented to achieve the identified load reductions.
- Estimate the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan.
- Provide an information/education component that will be used to enhance public understanding of the project and encourage the public's participation in selecting, designing, and implementing NPS management measures.
- Provide a schedule for implementing the NPS management measures identified in the watershed-based plan.
- Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.
- Identify a set of criteria for determining if loading reductions are being achieved and progress is being made towards attaining water quality standards and, if not, the criteria for determining if the watershed-based plan needs to be revised.
- Establish a monitoring component to evaluate the effectiveness of the implementation efforts.

3. REVIEW OF TMDL DEVELOPMENT

MapTech, Inc. was contracted by the VADEQ to develop TMDLs for the Dumps Creek watersheds in Russell County, Virginia. The EPA-approved TMDL document can be obtained at http://gisweb.deq.virginia.gov/tmdlapp/tmdl_report_search.cfm. Water quality monitoring, water quality modeling, and allocated reductions were reviewed to determine the implications of TMDL and modeling procedures for IP development.

3.1 TMDL Water Quality Monitoring Results

TMDL development typically relies on monitored data collected prior to the TMDL study (historical data) however, supplemental data is often collected during the TMDL study. In the case of the General Standard TMDL on Dumps Creek, the Virginia Department of Mines, Minerals and Energy (DMME) had two sweeps of benthic surveys and ambient water quality data collected during TMDL development to supplement the historical data. As a review, the historical benthic survey results are shown in this report. The quantity of historical ambient water quality data is great and can be found in the TMDL document. Generally, Total Dissolved Solids (TDS) measurements were moderately high with sporadic large spikes. Total Suspended Solids (TSS) measurements were generally low, with sporadic large spikes.

Modified RBP II benthic monitoring was conducted by the VADEQ at two sites on Dumps Creek. The results are shown in Table 3.1. All sampling results indicated that Dumps Creek is moderately impaired.

Table 3.1 Modified RBP II biological monitoring results for VADEQ stations on Dumps Creek.

Date	Target Station	Assessment	Reference Station
11/8/1990	DUM000.14	Moderately Impaired	NFH098.47
10/28/1991	DUM000.14	Moderately Impaired	NFH098.47
10/15/1992	DUM000.14	Moderately Impaired	NFH098.47
11/9/1993	DUM000.14	Moderately Impaired	NFH098.47
5/8/1995	DUM001.09	Moderately Impaired	NFH098.47
12/6/1995	DUM001.09	Moderately Impaired	SNK001.03
10/8/1997	DUM001.09	Moderately Impaired	PLL002.55
9/15/1998	DUM001.09	Moderately Impaired	PLL006.50
11/10/1999	DUM001.09	Moderately Impaired	PLL006.50
6/12/2000	DUM001.09	Moderately Impaired	DIS017.94

Virginia DMME arranged for additional benthic macroinvertebrate samples to be collected by Environmental Services & Consulting, LLC, (ES&C) at ten stations in the Dumps Creek Watershed. Concurrent with sampling of the benthic macroinvertebrate community, water chemistry samples were collected and analyzed by Summit Engineering Incorporated (SEI) for measurement of chemical/physical properties in the water column where the biological samples were collected. The sampling stations were selected to provide an overall view of the watershed (Table 3.2 and Figure 3.1). As reported by ES&C, the samples were collected following the USEPA RBP II (family level) survey. Macroinvertebrates were identified to either the lowest practical taxonomic level or family-level, whichever was higher.

Results of monitoring are presented in Tables 3.3 through 3.5. It is impossible to make significant observations based on a single sampling event, however, the measurements made are in general agreement with the historical data. Because DC-10 had the best habitat score, the sample collected there was used to calculate the community loss index values at the remaining stations. MapTech personnel used the metric data supplied by ES&C to calculate metric scores and corresponding bioassessments (Table 3.4), using DC-10 as a reference site. The overall bioassessment at the target sites is generally higher than assessments developed by VADEQ due to the conditions at DC-10 relative to reference sites used by VADEQ. The water chemistry data (Table 3.5) shows the highest TSS values at DC-04, DC-06, DC-07, and DC-08, while the highest TDS values were at DC-01, DC-04, DC-05, and DC-06. With the exception DC-01 (Hurricane Fork), all of these stations are located on Dumps Creek and correspond to some of the lowest bioassessment scores in the watershed.

Table 3.2 DMME water chemistry and biological sampling stations.

Station ID	Description	Chem Date	Bio Date
1	Upstream Hurricane Fork	1/28/02	2/1/02
2	Hurricane above pile	1/28/02	2/2/02
3	Hurricane below pile	1/28/02	2/2/02
4	Dumps above Hurricane Fork	1/28/02	2/2/02
5	Dumps below pond 1101607	1/28/02	2/1/02
6	Dumps Below pond 1101681	1/28/02	2/1/02
7	Above confluence with Chaney Creek	1/28/02	2/1/02
8	Dumps at confluence with Clinch River	1/28/02	2/1/02
9	Chaney Creek downstream	1/28/02	1/31/02
10	Chaney Creek upstream	1/28/02	1/31/02

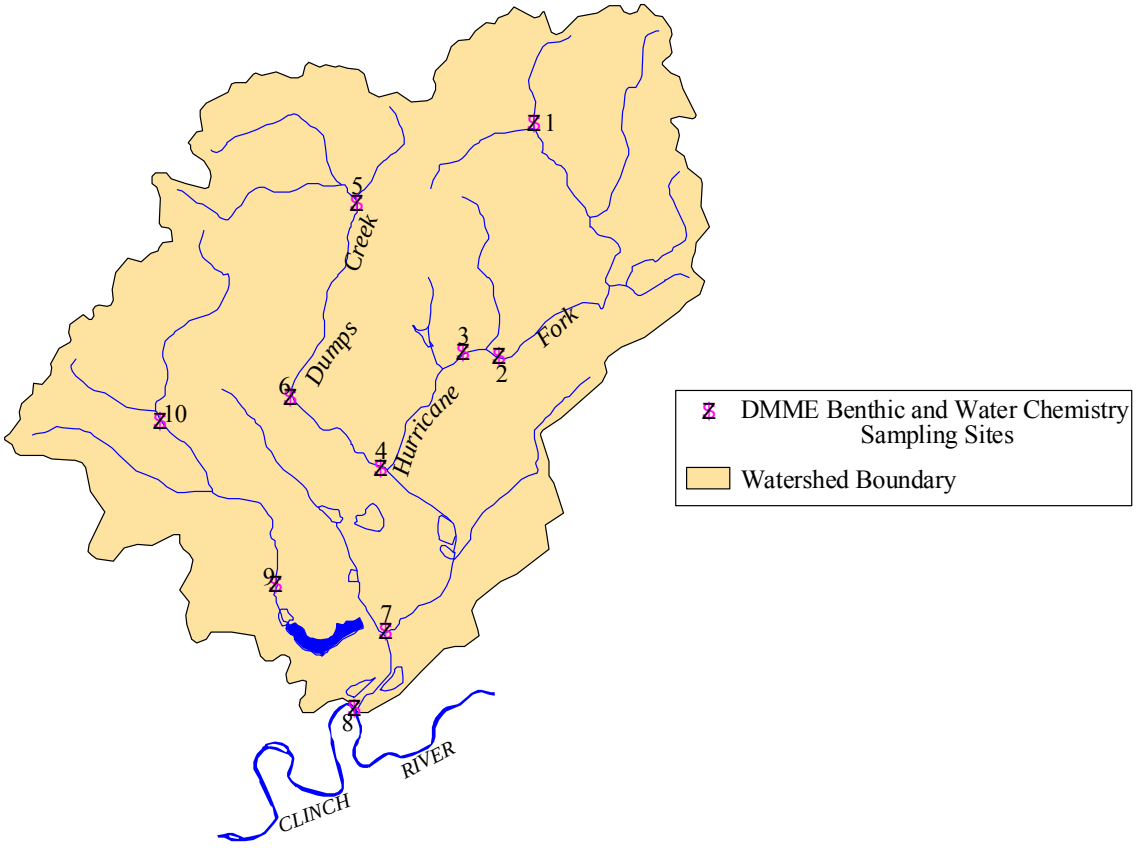

Figure 3.1 Benthic Macroinvertebrate and Water Chemistry Sampling Conducted by DMME

Table 3.3 Comparison of Metric Values between Ten Benthic Macroinvertebrate Sample Stations (Samples collected by ES&C, 10/9/ 2001)

Metrics [1]	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
TR	20	22	17	16	16	15	25	23	20	21
MFBI	1.9	5.0	4.7	4.7	5.6	4.4	4.9	5.0	4.7	4.6
SCR/FC	0.125	0.26	0.287	0	0.005	0.032	0.161	0.077	0.060	0.106
EPT/C	4.75	2.702	3.16	3.471	2.015	4.391	1.099	0.408	5.193	5.386
% DT	39.7	30.0	26.0	45.5	45.5	45.5	36.1	51.5	28.1	33.6
EPTI	8	13	11	7	6	8	14	9	11	12
SHR/T	0.336	0.106	0.114	0.044	0.012	0.068	0.072	0.094	0.026	0.282
CLI	0.60	0.318	0.706	0.500	0.563	0.600	0.360	0.478	0.350	0.000

[1]TR: taxa richness, MFBI: Modified Family Biotic Index, SCR/FC: Scraper/Filter Collector ratio, EPT/C: EPT/Chironomidae, %DT: percent Dominant Taxon, EPTI: EPT Index, CLI: Community Loss Index
[2]ERR: not calculable

Table 3.4 Comparison of Bioassessment Scores with the least impacted station (DC-10), data collected by ES&C.

Metrics [1]	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
TR	6	6	6	3	3	3	6	6	6	6
MFBI	6	6	6	6	3	6	6	6	6	6
SCR/FC	6	6	6	0	0	3	6	6	6	6
EPT/C	6	3	3	3	3	6	0	0	6	6
% DT	3	6	6	3	3	3	3	0	6	3
EPTI	0	6	6	0	0	0	6	3	6	6
SHR/T	6	3	3	0	0	0	3	3	0	6
CLI	3	6	3	3	3	3	6	6	6	6
Total Score	36	42	39	18	15	24	36	30	42	45
% Comp to DC-10	80.0	93.3	86.7	40.0	33.3	53.3	80.0	66.7	93.3	100

[1]TR: taxa richness, MFBI: Modified Family Biotic Index, SCR/FC: Scraper/Filter Collector ratio, EPT/C: EPT/Chironomidae, %DT: percent Dominant Taxon, EPTI: EPT Index, SHR/T: Shredder/Total Abundance ratio, CLI: Community Loss Index

Table 3.5 Water chemistry results from samples collected in the Dumps Creek watershed on 1/28/02 (Part 1 of 2)

PARAMETER	METHOD	DC—01	DC—02	DC—03	DC—04	DC—05
PH	EPA 150.1	7.12*	7.27*	7.31*	8.19*	8.39*
DISSOVLED IRON (mg/L)	EPA 7000 A	0.03**	0.12**	0.11**	0.32**	0.09**
TOTAL IRON (mg/L)	EPA 7000 A	0.05	0.21	0.18	1.89	0.29
DISSOLVED MANGANESE (mg/L)	EPA 7000 A	<0.02**	0.02**	0.02**	0.04**	0.04**
TOTAL MANGANESE (mg/L)	EPA 7000 A	<0.02	0.03	0.03	0.05	0.05
TSS (mg/L)	EPA 160.2	1.6	3.2	1.6	22.4	3.6
TOTAL DISSOLVED SOLIDS (mg/L)	EPA 160.3	300	186	184	388	540
ACIDITY (mg/L)	EPA 305.1	<1	<1	<1	<1	<1
ALKALINITY (mg/L)	EPA 310.1	53	37	41	159	331
CONDUCTIVITY (µmhos/cm)	EPA 120.1	400	270	260	555	775
SULFATE (mg/L)	EPA 375.4	136	82	76	104	104
TYPE OF FLOW		M	M	M	M	M

*Exceeded holding time before Lab pH analyzed, **Dissolved iron and Dissolved Manganese were analyzed on a sample that was acidified before being filtered.

Table 3.5 Water chemistry results from samples collected in the Dumps Creek watershed on 1/28/02 (Part 2 of 2)

PARAMETER	METHOD	DC—06	DC—07	DC—08	DC—09	DC—10
PH	EPA 150.1	8.15*	7.77*	7.77*	7.78*	7.74*
DISSOVLED IRON (mg/L)	EPA 7000 A	0.11**	0.15**	0.21**	0.15*	0.33**
TOTAL IRON (mg/L)	EPA 7000 A	0.40	0.23	0.44	0.46	1.78
DISSOLVED MANGANESE (mg/L)	EPA 7000 A	<0.02**	0.02**	0.03**	0.02**	0.04**
TOTAL MANGANESE (mg/L)	EPA 7000 A	0.02	0.02	0.03	0.02	0.05
TSS (mg/L)	EPA 160.2	9.6	10.0	25.6	4.0	5.6
TOTAL DISSOLVED SOLIDS (mg/L)	EPA 160.3	420	288	286	220	294
ACIDITY (mg/L)	EPA 305.1	<1	<1	<1	<1	<1
ALKALINITY (mg/L)	EPA 310.1	167	95	97	70	54
CONDUCTIVITY (µmhos/cm)	EPA 120.1	580	404	408	343	412
SULFATE (mg/L)	EPA 375.4	104	84	88	68	129
TYPE OF FLOW		M	M	M	M	M

*Exceeded holding time before Lab pH analyzed, **Dissolved iron and Dissolved Manganese were analyzed on a sample that was acidified before being filtered.

3.2 Water Quality Modeling

In order to understand the implications of the load allocations determined during TMDL development, it is important to understand the modeling methods used in the analysis. The Dumps Creek TMDL was unusual among Virginia's General Standard TMDLs, in that the approach was to use a bioassessment model to relate in-stream water quality to the health of the aquatic community. Through this approach, interactions of multiple stressors were considered, and allocations were based on attaining a non-impaired condition of the aquatic community.

The Hydrologic Simulation Program FORTRAN (HSPF) water quality model was used as the modeling framework to simulate hydrology and the transport of water quality constituents (*e.g.*, TDS and TSS) to the stream. Seasonal variations in hydrology, climatic conditions, and watershed activities can be explicitly accounted for in the HSPF model. HSPF simulated a time-series of values for each stressor at specified locations in Dumps Creek. The time-series output was used with the seven biometric models to calculate expected biometric values from which bioassessments were calculated and used to provide an estimate of the status of the water body (*i.e.,* severely impaired, moderately impaired or non-impaired).

A sensitivity analysis was performed to determine which stressor reductions were most effective in improving the bioassessment condition. The bioassessment condition was found to be most sensitive to reductions in TSS and TDS. Multiple runs were performed to investigate the reductions necessary to achieve a non-impaired status. Table 3.6 shows some of the scenarios investigated including the final allocation scenario (Scenario C).

Table 3.6 Average bioassessment score for various allocation scenarios in the Dumps Creek impairment.

Scenario Description	Average Bioassessment	Impairment Condition
Existing conditions	73%	Moderately Impaired
Scenario A: 50% of TSS from nonpoint sources	80%	Moderately Impaired
Scenario B: 50% of TSS from nonpoint sources 20% of TDS from nonpoint sources	85%	Non-Impaired
Scenario C: 40% of TSS from nonpoint sources 34% of TDS from nonpoint sources	85%	Non-Impaired

3.3 Implications of TMDL and Modeling Procedure on Implementation Plan Development

The major implication in the development of these TMDLs is that moderate reductions are required to achieve the water quality standard. No reductions to existing loads from permitted discharges were indicated. However, there are subtler implications as well. Implicit in the lack of reduction in the permitted discharges is the need to maintain loads at or below existing

conditions. Any increase in this waste load would have to be offset by reductions elsewhere in the watershed.

4. PUBLIC PARTICIPATION

Public participation was an integral part of the TMDL Implementation Plan development in the Dumps Creek watershed, and it is also critical to promote reasonable assurances that the implementation activities will occur. Public participation took place on three levels.

First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project as well as for soliciting participation in the smaller, more-targeted meetings. Second, working groups (WG) for industrial, and environmental/governmental issues were formed from communities of people with common concerns regarding the TMDL process, and were the primary arena for seeking public input. A representative from VADEQ attended each working group meeting in order to facilitate the process and integrate information collected from the various communities. Third, a Steering Committee was formed with representation from the working groups, VADEQ, VADMME, Russell County government agencies, and MapTech.

The overall goal of the Working Groups was to identify obstacles to implementation in their respective communities and recommend workable solutions that will overcome these obstacles. In addition, the Working Groups were expected to: identify funding/partnering opportunities that would help to overcome obstacles to implementation, review the IP from an environmental perspective, identify the regulatory authority in the specific areas related to implementation, identify existing programs and resources that might be relevant to the situation, and propose additional programs that would support implementation. The Steering Committee had the express purpose of formulating the TMDL IP. In addition, this committee had the responsibility for identifying control measures that are founded in practicality, establishing a timeline to ensure expeditious implementation, and setting measurable goals and milestones for attaining water quality standards.

Attendance at public meetings is critical to the public participation effort, and was encouraged through announcements in the *Virginia Register,* postings in the watershed, and contact the local SWCD.

All meetings conducted during the course of the TMDL IP development are listed in Table 4.1. Individuals on local, state, and federal levels representing industrial, residential, environmental, and governmental interests devoted hundreds of work-hours to attending meetings.

Table 4.1 Public participation during implementation plan development for the Dumps Creek watershed area.

Date	Type	Location	Attendance[1]
10/17/05	1st Public	Cleveland Recreation Ball Park Facility Cleveland, VA	23
11/14/05	1st Industrial WG	VDOT Lebanon, VA	12
12/16/05	1st Government and Environmental WG	Clinch Valley SWCD Lebanon VA	12
1/17/06	1st Steering Committee	Cumberland Plateau PDC offices Lebanon VA	8
1/18/06	2nd Industrial WG	AEP Building Carbo, VA	11
1/23/06	2nd Government and Environmental WG	USDA Office Lebanon, VA	7
8/2/06	3rd Industrial WG	Russell County Public Library Lebanon, VA	12
8/28/06	3rd Government and Environmental WG	Russell County Public Library Lebanon, VA	12
	2nd Steering Committee		
	Final public		

[1]The number of attendants is estimated from sign up sheets provided at each meeting. These numbers are known to underestimate the actual attendance.

4.1 Public Meetings

The first public meeting was held on October 17, 2005 at the Cleveland Recreation Center in Cleveland, Virginia. It served to inform the public regarding the end goals and status of the

project. It also served as a forum for soliciting participation in the smaller, more-targeted meetings. The meeting, which was publicized via email, posted signs, and notices in the Virginia Register, was attended by 23 people, including representatives from VADEQ, VADCR, DMME, New River Highlands RC&D, Clinch Valley SWCD, Virginia Department of Transportation (VDOT), The Nature Conservancy, Appalachian Electric Power (AEP), the Tennessee Valley Authority (TVA), and various consulting firms, including MapTech.

4.2 Indusrial Working Group

The Industrial Working Group (IWG) consists primarily of representatives from the mining industry and their affiliates. The IWG was given the responsibility for identifying existing efforts as well as possible constraints to implementation, investigating alternative funding sources/partnerships, and evaluating various corrective actions, costs, tracking procedures, and technical assistance needs. Meeting dates and locations are described in Table 4.1. Participants included representatives from VADEQ, VDOT, DMME, MapTech, and local industry.

At the meetings, the TMDL was reviewed and participants were asked to comment regarding the following topics:

- Availability of additional data.
- Potential for AML reclamation (remining).
- More timely reclamation.
- Dust control.
- BMPs on hall roads.
  - Runoff control
  - Stabilization
- BMPs on existing discharges.
- Other BMPs

The discussion focused on four major topics; AML, gas wells, forestry, and active mine operations. Each of these topics is expanded upon below. In addition, cost estimates were revised based on inputs from the group.

4.2.1 AML

It was suggested that the initial estimate of AML acreage given in the TMDL was too high. Based on this input the AML coverage was overlaid with updated mine permit mapping. It was assumed that any AML feature that fell within a permitted area would have been reclaimed

during operation of the permit. As a result the total AML acreage estimate was reduced to 545 acres. Discussion of reclamation efforts concentrated largely on reclamation of the gob pile adjacent to Hurricane Fork. This gob pile is the generally recognized as the most significant AML feature in the Dumps Creek watershed. Discussion regarding reclamation of the gob pile covered the availability of funds to support the project, the potential for re-mining the pile for use in a proposed power plant that could utilize the gob, and the costs involved with reclamation.

Efforts by DMLR to establish a method for assigning mitigation credits for off-site AML reclamation were discussed. This effort may provide incentive for reclamation of AML in the watershed including reclamation (re-mining) of the Hurricane Fork gob pile. Also, it was determined during the course of the IP development that reclamation of the Hurricane Fork gob pile would not qualify for In Lieu Fee Funding

4.2.2 Gas Wells

Gas well activity in the Dumps Creek watershed has been increasing (Figure 4.1), due to infrastructure improvements and a favorable economic climate. It is anticipated that gas wells will be installed at a rate of approximately four per year in the next few years, with a maximum density of one well per 60 acres. Estimates of the amount of land disturbed were adjusted, based on input from the working group, to reflect an average access road of ½ mile in length and 25 ft in width.

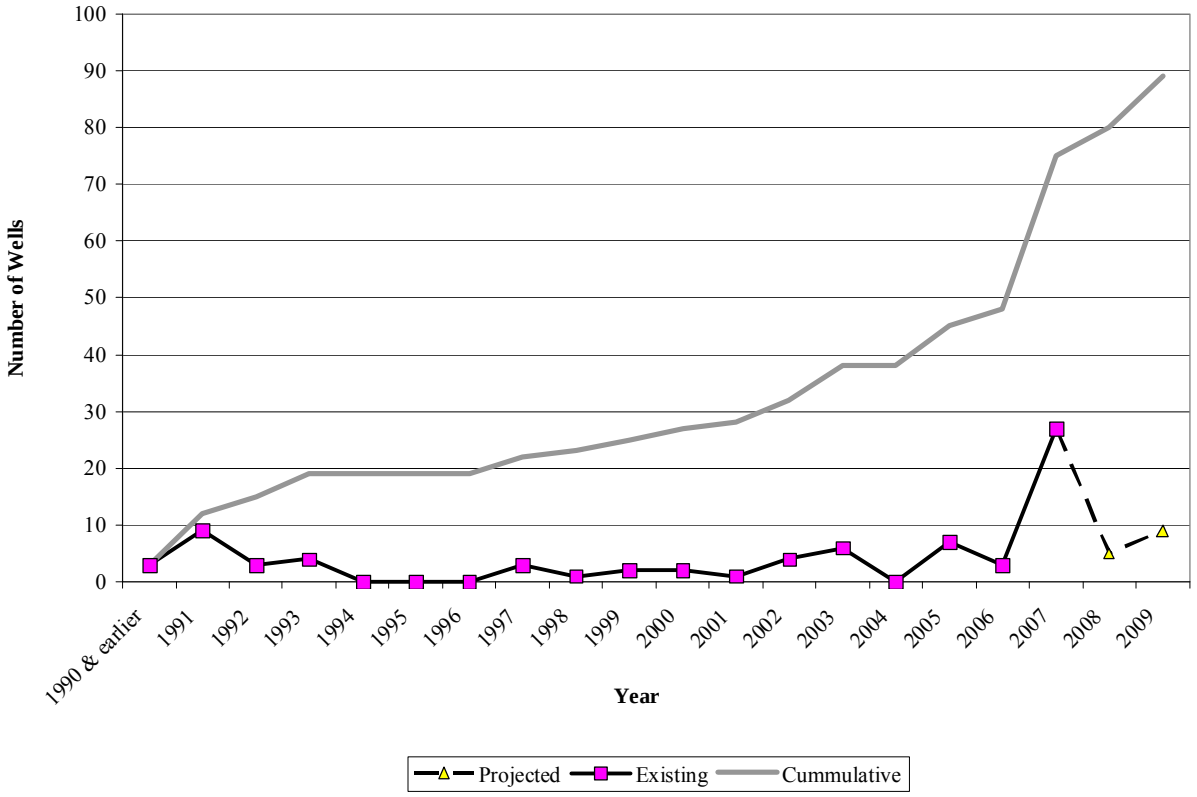

Figure 4.1 Existing and projected gas well production in Dumps Creek.

4.2.3 Forestry

The primary landowner in the Dumps Creek watershed is Heartwoood Forest Land Fund 4, L.P. The land is managed for Heartwood by the Forest Land Group, who participates in the Forest Stewardship Council. The Forest Land Group sells trees primarily to Mountain Forest Products, who employs certified Sustainable Harvesting and Resource Professional (SHARP) loggers to remove the trees. Training in the SHARP Logger program is provided by Virginia Tech, Virginia Cooperative Extension Service, Virginia Department of Forestry, forest products industry professionals, and others. The program provides training in the sustainable harvest of forests, including the use of appropriate BMPs to protect water quality. The Virginia Department of Forestry (DOF), Forest Land Group, and Mountain Forest Products each inspect logging jobs, resulting in almost weekly inspections. It was recognized that there are other private forest landowners in the watershed and additional outreach and education may be needed.

4.2.4 Active Mine Operations

While no reductions to active mine operations were specifically cited in the TMDL, it was pointed out that approximately 39,500 square feet of roads were paved since the development of the TMDL. Additionally, approximately 2,500 feet of streambank stabilization has been completed, with 11 acres of vegetated buffers installed.

4.3 Government and Environmental Working Group

The G&EWG was formed to identify funding sources and available technical resources, specify the appropriate measurable goals and timeline for achievement, and report on the regulatory goals that are currently in place. Representatives from VADEQ and MapTech attended each working group meeting in order to facilitate the process and integrate information collected from the various communities. Meeting dates and locations are described in Table 4.1. Participants included representatives from VADEQ, VDOT, DMME, ACOE, Clinch Valley SWCD, Nature Conservancy, and MapTech.

At the meetings, the TMDL was reviewed and participants were asked to comment regarding the following topics:

- Availability of additional data.
- Potential for AML reclamation (remining).
- More timely reclamation.
- Dust control.
- BMPs on hall roads.
  - Runoff control
  - Stabilization
- BMPs on existing discharges.
- Other BMPs

Many of the comments reflected those of the Industrial Working Group. Regarding AML, it was suggested that a VISTA volunteer could be hired to carefully review aerial photography in an effort to identify AML features. Upon identification, the volunteer could make arrangements for a site inspection to confirm the existence of the feature. Regarding gas wells, it was suggested that additional education to promote avoiding the riparian area of streams when determining sites for gas wells, and that DMME-DGO could be responsible for distributing educational materials. Regarding forestry, it was suggested that a TMDL component be added to the SHARP logger training, to suggest that particular care should be taken to protect water quality in streams with

TMDLs that could be impacted by forest harvesting practices. In addition, cost estimates were revised based on inputs from the group.

4.4 Steering Committee

The Steering Committee consisted of representatives from the Industrial, and Environmental/Government working groups, VADEQ, Clinch Valley SWCD, MapTech, and Virginia's Division of Mined Land Reclamation (DMLR). Meeting dates and locations are described in Table 4.1. The first meeting was held after the first Working Group meetings were held. Results of these meetings were discussed and preliminary implementation scenarios were reviewed. At the second Steering Committee meeting, the draft IP was presented and commented on, prior to scheduling the final public meeting.

4.5 Summary

Many inputs and opinions were voiced throughout the public participation meetings regarding the IP process. Most members of the working groups agreed that the IP should focus on targeting resources toward reclamation of the most obvious AML features, such as the Hurricane Fork gob pile. This work should be combined with education, regarding the placement and maintenance of gas wells, as well as proper installation and maintenance of both mining and forestry BMPs. Additional work would include efforts to identify additional AML features and funding mechanisms for reclaiming them.

5. ASSESSMENT OF IMPLEMENTATION ACTION NEEDS

An important element of the TMDL IP is the encouragement of voluntary compliance with implementation actions by local, state, and federal government agencies, business owners, and private citizens. In order to encourage voluntary implementation, information was obtained on the types of actions and program options that can achieve the goals practically and cost-effectively. This section outlines the methods used to identify practical and effective BMPs, or control measures, and quantify the BMPs needed to meet water quality goals.

5.1 Identification of Control Measures

Potential control measures, their associated costs and efficiencies, and potential funding sources were identified through input from Working Groups, and literature review. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts. The assurance of implementation of specific control measures was assessed through discussion with the Working Groups and the Steering Committee. Control measures were selected through a process of stakeholder review and analysis of effectiveness in these watersheds.

Various scenarios were developed and presented to the Working Groups. Practices that specifically address the delivery of sediment and TDS to the stream were identified. Control measures included forest-harvesting BMPs, gas well dirt road stabilization, and streambank restoration.

The final set of control measures identified and the efficiencies used in this study to estimate needs are listed in Table 5.1. The control measures listed in this table are divided into categories based on the method of load reduction. "Direct Reductions" are those that reduce the load of pollutant from a specific source to the stream itself or to the land. "Buffer" practices control pollutants through both a land conversion and treatment of runoff from an upstream area. "Runoff Treatment" measures are those that either treat runoff from a given land area (*e.g.*, retention ponds) or treat runoff based on changing the runoff-producing characteristics of the land (*e.g.*, improved pasture management).

Table 5.1 Potential control measure costs and efficiencies in removing FC.

Control Measure	Efficiencies		Reference
	Sediment	TDS	
Direct Reduction Efficiency			
Streambank Restoration	2.55 lbs/ft/yr	0.0035 lbs/ft/yr	3
Buffer Efficiency[1]			
Vegetated Buffer	50%	50%	3
Runoff Treatment Efficiency			
AML Reclamation	80 - 99%	80 - 99%	2
Haul Road Stabilization	80 - 90%	70 - 90%	2

1 Buffer efficiencies shown here are applied to runoff from twice the buffer area upstream of the buffer. Additional reductions result from the conversion of land from its existing condition to the buffer area.
2 Removal efficiency is defined by the practice, and the .
3 Commonwealth of Virginia. 2005. Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy. www.naturalresources.virginia.gov/Initiatives/TributaryStrategies/

5.2 Quantification of Control Measures

The quantity of control measures required during implementation was determined through spatial analyses, modeling alternative implementation scenarios, and working group member requests. Spatial analyses included the processing of data that included land use, stream networks, and elevation, along with data archived from the TMDL development documents. The map layers and archived data were combined to establish the number of control measures required. The quantities of control measures were determined through modeling alternative scenarios and applying the related reduction efficiencies to their associated loads.

Implicit in the TMDL is the need to avoid increased delivery of pollutants from sources that have not been identified as needing a reduction, and from sources that may develop over time, as implementation proceeds. One potential for additional sources of the pollutants identified are future increases in coal mining, forest harvesting and gas well installation. Care should be taken to monitor land changes and its impacts on water quality.

5.2.1 Industrial Control Measures: Regulations Overview

Resource extraction (coal mining and gas well drilling) companies in the Dumps Creek watershed are regulated by the DMME. They are required to follow environmental and safety regulations in order to prevent negative impacts on the environment and human health. One such regulation is the placement of retention ponds to collect all runoff water from active surface

mining sites. These ponds must be designed to hold runoff from a 10 year 24 hour storm. Depending on the permit, there are regulations for flow, pH, and concentrations for iron (Fe), manganese (Mn), total suspended solids (TSS), and chloride in the outfalls and/or nearby streams. Mining sites are inspected regularly. More information can be found at http://www.mme.state.va.us/Dmm/default.htm. The company must pay a bond up front for each permit, which is held until the active site is sufficiently reclaimed. If not, the money is forfeited over to DMME and they reclaim the land.

The gas well drilling companies are required to install sumps or ponds to collect runoff from gas well areas. The roads leading to the wells must be maintained and must have water bars to divert water from the roadway. Construction typically lasts 60 days and grass is planted on and along the road and around the well site. Gas well companies also must pay bonds for reclamation that can be forfeited if reclamation is not adequate. More information can be found at http://www.dmme.virginia.gov/Dgo/default.htm; Section 25-150-260 contains the erosion, sediment control and reclamation regulations and Section 25-150-270 deals with stormwater management.

The Virginia Department of Forestry (VDOF) is in charge of regulating any logging operations of commercial or private entities. A logging company must call the VDOF to report that they are going to harvest an area within 3 days of starting. A VDOF representative inspects the site before, during (typically every 30 days), and after harvesting. There is a zero tolerance for sedimentation in nearby streams; if the VDOF thinks there is sedimentation possible, the loggers must have measures in place to prevent sediment travel within 10 days of a citation. Some BMPs recommended on logging areas are not harvesting trees near streams (leaving a vegetated stream buffer), water bars, hardened stream crossings (*i.e.,* culverts, bridges), and seeding and mulching bare areas upon completion. More information of logging BMPs can be found at http://www.dof.virginia.gov/wq/index-bmp-guide.shtml. If BMPs are not in place, special orders are handed to the company; fines are then assessed based on the extent of the disturbance and any prior citations. This money is channeled into an education fund used to train loggers in environmental practices.

5.2.2 Land-Based and In-Stream Control Measures

The Dumps Creek TMDL requires reductions to sediment and TDS loads. In order to meet these strict requirements, the BMPs in Table 5.7 must be implemented. A staged approach to implementation is described in Chapter 6 of this document.

Table 5.2 Land-based BMPs required to meet the Dumps Creek TMDL.

Control Measure	Units	Installed	Needed
Reclamation of Abandoned Mine Land	Acre	0	273
Dirt Road Stabilization	Acre	1	123
Vegetated Buffer	Acre	11	5
Streambank Stabilization	Feet	2,500	2,640

5.3 Technical Assistance and Education

Several education/outreach techniques will be utilized during implementation. Articles describing the TMDL process, the reasons why high levels of the pollutants are a problem, the methods through which the problem can be corrected, the assistance that is currently available for stakeholders to deal with the problem, and the potential ramifications of not dealing with the problem should be made available to the stakeholders through as many channels as possible (*e.g.,* DMME handouts, VDOF handouts, and targeted mailings). It was determined during Working Group Meetings that much of this work could be accomplished through existing agency structures. However, additional needs include identification of AML features that should be addressed during implementation, and tracking of implementation progress.

Technical Assistance Tasks

1. Identify AML features that should be addressed during implementation.
2. Work with DMLR personnel to identify potential avenues for remediation.
3. Develop educational materials that can be handed out by DMME and VDOF personnel.
4. Distribute educational materials.
5. Correspond with DMME, VDOF, and Division of Gas and Oil (DGO) to encourage and track BMP installation.
6. Assess progress toward implementation goals.

Based on input from the Working Groups, it was determined that most of the Technical Assistance needed for implementing this IP could be supplied by existing agency personnel. For

instance VADCR personnel can develop literature regarding the TMDL and potential control measures. This information can be distributed through DMME, DGO, and VDOF permitting and educational programs (*e.g.*, the SHARP Logger Program). The remaining work would include identification of AML features through review of aerial photography and site visits, identification of potential avenues for remediation, and tracking progress toward implementation. It is anticipated that these tasks could be accomplished by a VISTA volunteer, in coordination with DMLR, DGO, and VDOF personnel. The CVSWCD has agreed to provide working space for this volunteer.

5.4 Cost Analysis

5.4.1 Land-Based and In-Stream Control Measures

The costs outlined in Table 5.3 were determined through review of available literature and discussion with stakeholders. The estimated cost of implementing all control measures in the Dumps Creek watershed is $3.35 million. The cost of each of the control measures selected for this IP is highly variable, depending on the specific conditions where the control measure is implemented. The costs listed here are anticipated average costs that are the best estimates available at this time.

Table 5.3 Control measure costs and needs.

BMP	Unit	Cost per Unit	In place since TMDL (#)	Needed (#)	Cost ($)
Reclamation of Abandoned Mine Lands	(ac)	$10,000	0	273	$2,730,000
Haul Road Stabilization	(ac)	$700	1	123	$86,100
Vegetated Buffer:	(ac)	$700	11	5	$3,500
Streambank Stabilization	(ft)	$200	2,500	2,640	$528,000
Total Estimated BMP Costs					**$3,347,600**

5.4.2 Technical Assistance

It was determined by the Working Group and Steering Committee members that much of the educational work to support implementation could be accomplished by existing agency personnel through the course of their normal activities. The additional work could be

accomplished by a VISTA volunteer. Based on Working Group input, it would require $3,000 to support one VISTA volunteer for a year. With an anticipated 5-year period, the total potential cost to provide technical assistance during implementation is expected to be $15,000 total for 5 years.

5.4.3 Total Estimated Costs

The total estimated costs for the implementation of BMPs in the Dumps Creek watershed is shown in Table 5.4. The technical assistance cost assumes a need of 1 VISTA volunteer for the first 5 years with the remaining technical assistance needs being provided by existing agency personnel. The total cost to implement the BMPs needed in this watershed is estimated at $3.36 million.

Table 5.4 Total estimated costs to meet the Dumps Creek TMDL.

Cost Item	Cost ($)
Reclamation of Abandoned Mine Lands	$2,730,000
Haul Road Stabilization	$86,100
Vegetated Buffer:	$3,500
Streambank Stabilization	$528,000
Technical Assistance	$15,000
Total Estimated BMP Costs	**$3,362,600**

5.5 Benefit Analysis

The primary benefit of implementation is cleaner waters in Virginia. Specifically, the aquatic community in this stream will be restored. Table 5.5 indicates the cost efficiencies of the various practices being proposed in this IP. Based on this analysis, vegetated buffers have the greatest potential for improving water quality in the Dumps Creek watershed, however, there are limited opportunities for implementation of vegetated stream buffers, as a significant portion of the watershed is forested. A similar situation exists for streambank stabilization, but, in addition to having limited opportunities for implementation, the reduction to TDS loads is anticipated to be

insignificant. This leaves reclamation of AML as the most promising control measure for Dumps Creek.

In addition to allowing the aquatic community to thrive, the control measures that will be implemented to control sediment and TDS will also serve to reduce delivery of other pollutants to the stream from upland locations. Many of the BMPs intended to reduce soil and TDS losses should increase infiltration of precipitation, decreasing peak flows downstream.

Table 5.5 Cost efficiencies of control measures in units removed per $1,000.

Control Measure	Sediment (kg)	TDS (kg)
Reclamation of Abandoned Mine Land	237	134
Dirt Road Stabilization	287	39
Vegetated Stream Buffer	18,073	9,025
Streambank Stabilization	899	-

An important objective of the implementation plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities. While most of the proposed control measures do not have a direct tangible economic benefit, they were selected, in part, based on the economic feasibility of implementation. Specifically, the primary control measure (reclamation of AML) can often be achieved through re-mining, or as a mitigation effort to balance other stream disturbances. Implementation of the recommended control measures will have the added benefit of protecting downstream resources. Specifically, Dumps Creek is a tributary of the Clinch River, which is considered one of the only ecologically intact (undammed) headwaters of the Tennessee River system. The Clinch River watershed is the number one hotspot in the U.S. for imperiled aquatic species. Combined with the rare plants, mammals, birds, and insects that live in the watershed, the Clinch Valley and its rivers support 30 federally listed threatened or endangered species.

6. MEASURABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS

Given the scope of work involved with implementing these TMDLs, full implementation is expected in ten years, with de-listing from the Virginia Section 303(d) list within 15 years. Described in this section are the identification of milestones, the timeline for implementation, and targeting of control measures.

6.1 Milestones Identification

The end goals of implementation are restored water quality of the impaired waters and subsequent de-listing of Dumps Creek from the Commonwealth of Virginia's Section 303(d) list within 15 years. Progress toward end goals will be assessed during implementation through tracking of control measure installations and continued water quality monitoring.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the amount of control measures installed within certain timeframes, while water quality milestones establish the corresponding improvements in water quality that can be expected as the implementation milestones are met. The milestones described here are intended to achieve full implementation within 10 years, leaving five years to assess water quality for de-listing. These goals are the basis for two of the milestones (*i.e.*, full implementation at the 10-year mark, and de-listing at the 15-year mark).

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures first. For instance, it is anticipated that the greatest water quality benefit will be gained through remediation of the most obvious AML features (*e.g.*, the Hurricane Fork gob pile). This IP has been laid out as a two stage process, where the focus during Stage I is on identification and reclamation of AML features and haul road stabilization, but the efforts expand to include streambank stabilization and vegetated buffers in Stage II. The two five-year implementation stages will be followed by five years of water quality monitoring.

Table 6.1 shows the types and quantities of BMPs to be installed during each stage. It is anticipated that the de-listing of the impaired segments from the Section 303(d) list will occur by 2023.

Table 6.1 Stage I and Stage II implementation goals for Dumps Creek.

Control Measure	Unit	Stage I (#)	Stage II (#)
Reclamation of Abandoned Mine Lands	(ac)	100	173
Haul Road Stabilization	(ac)	50	73
Vegetated Buffer:	(ac)	0	5
Streambank Stabilization	(ft)	500	2,140

6.2 Timeline

A ten-year implementation plan timeline was formulated for the Dumps Creek watershed (Figures 6.1, Table 6.2). The timelines describe the needs for implementation in terms of completion of the control measures.

Table 6.2 Proposed milestones for implementation of control measures.

	Implementation Milestones				Water Quality Milestones: Percentage of Load Reduction Goals	
Date	Reclamation of AML (acres)	Haul Road Stabilization (acres)	Vegetated Buffers (acres)	Streambank Stabilization (feet)	TDS (%)	Sediment (%)
1/1/2008		Current Implementation			9	24
1/1/2009	10	8	0	500	14	30
1/1/2010	25	17	0	500	22	34
1/1/2011	45	27	0	500	33	38
1/1/2012	60	38	0	500	41	41
1/1/2013	100	50	0	500	63	50
1/1/2014	150	63	0	500	89	60
1/1/2015	200	77	5	1,000	100	76
1/1/2016	250	91	5	1,500	100	90
1/1/2017	273	106	5	2,000	100	99
1/1/2018	273	123	5	2,640	100	100
1/1/2023		De-listing from 303(d) List			100	100

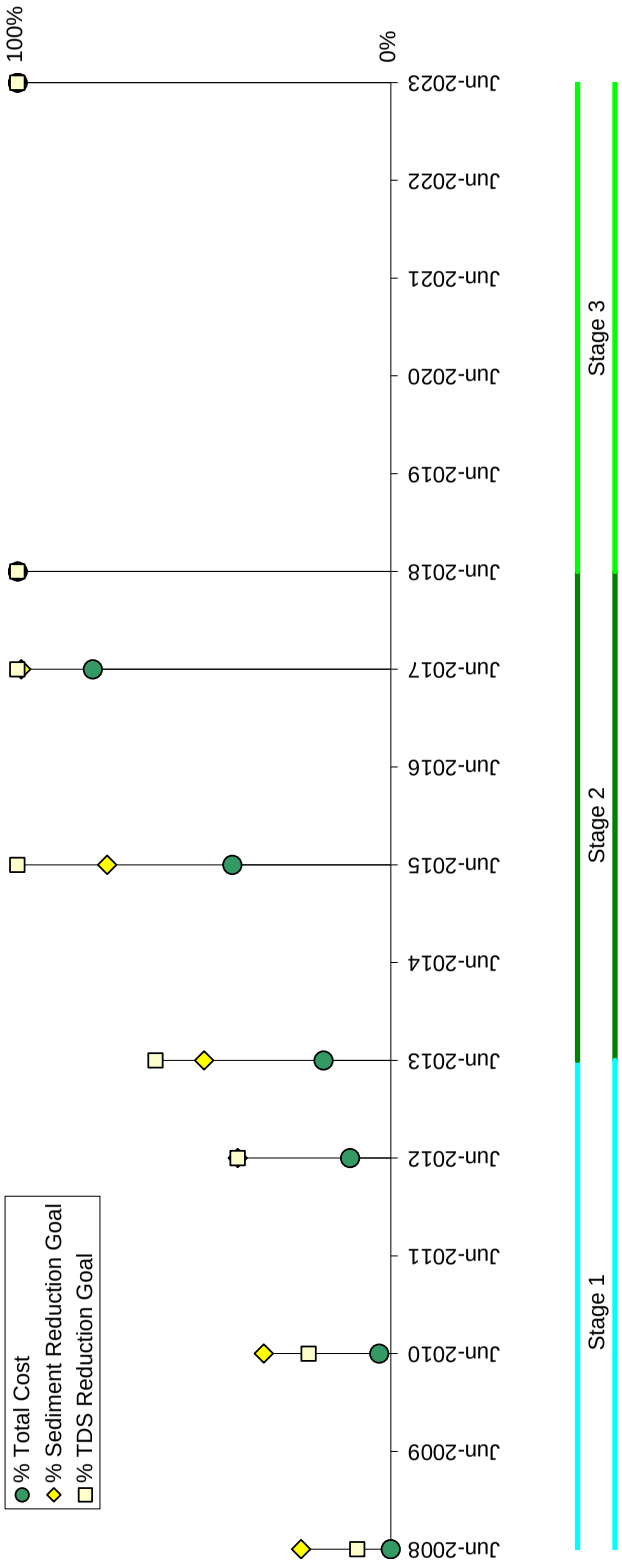

Figure 6.1 Timeline for implementation in the Dumps Creek watershed.

6.3 Targeting

Implicit in the process of a staged implementation is targeting of control measures: this ensures optimum utilization of resources. In the case of Dumps Creek, the most obvious AML features have been identified and remediation of these sites is being pursued. As additional AML features are identified, efforts should be made to prioritize their remediation based on proximity to the stream and the degree of disturbance.

7. STAKEHOLDERS AND THEIR ROLE IN IMPLEMENTATION

Stakeholders are individuals or entities who live or have land management responsibilities in the watershed, including private individuals, businesses, government agencies, and special interest groups. Stakeholder participation and support is essential for achieving the goals of this effort (*i.e.*, improving water quality and removing streams from the impaired waters list). The purpose of this chapter is to identify and define the roles of the stakeholders who will work together to implement the IP. The roles and responsibilities of some of the major stakeholders are described below.

7.1 Federal Government

The United States Environmental Protection Agency

The EPA has the responsibility of overseeing the various programs necessary for the success of the Clean Water Act. However, administration and enforcement of such programs falls largely to the states.

The United States Office of Surface Mining

The OSM is responsible for balancing the nation's need for continued domestic coal production with protection of the environment. The OSM works with colleges and universities and other State and Federal agencies to further the science of reclaiming mined lands and protecting the environment. While the responsibility for administering and enforcing specific programs is primarily incurred by the states, OSM provides funding and technical support for the reclamation of lands and water degraded by mining operations before 1977 (AML).

The United States Army Corps of Engineers

The Corps' primary responsibility, with regard to this IP, is in permitting activities in "wetlands and waterways." Within this program, the Corps was originally intended to prevent obstructions to navigation. However, passage of the Clean Water Act in 1972 greatly broadened this role by giving the Corps authority over dredging and filling in the "waters of the United States," including many wetlands. Numerous relatively minor activities in wetlands and waterways are covered by regional or nationwide general permits. However, some more complex activities (*e.g.*, moving Hurricane Fork away from the toe of the gob pile) require a specific permit.

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS)

The NRCS is the federal agency that works hand-in-hand with the American people to conserve natural resources on private lands. The NRCS assists private landowners with conserving their soil, water, and other natural resources. Local, state and federal agencies and policymakers also rely on the expertise of NRCS personnel. While agricultural practices were not identified as an issue of concern, the NRCS is also heavily involved with stream restoration efforts and may be able to lend expertise in this area. For more information on NRCS, visit http://www.nrcs.usda.gov/.

7.2 Virginia Agencies and Programs

In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are seven state agencies responsible for regulating and/or overseeing statewide activities that impact water quality in Virginia. These agencies are: VADEQ, VADCR, DMME (DMLR and DGO), VCE, VDH, VDOF, and the Virginia Department of Agriculture and Consumer Services (VDACS). Of these, the following five are pertinent to this impairment.

Virginia Department of Environmental Quality

The State Water Control Law authorizes the SWCB to control and plan for the reduction of pollutants impacting the chemical and biological quality of the State's waters resulting in the degradation of the swimming, fishing, shell fishing, aquatic life, and drinking water uses. For many years, the focus of VADEQ's pollution reduction efforts was the treated effluent discharged into Virginia's waters via the VPDES permit process. The TMDL process has expanded the focus of VADEQ's pollution reduction efforts from the effluent of wastewater treatment plants to the pollutants causing impairments of the streams, lakes, and estuaries. The reduction tools are being expanded beyond the permit process to include a variety of voluntary strategies and BMPs. The VADEQ is the lead agency in the TMDL process. The Code of Virginia directs the VADEQ to develop a list of impaired waters, develop TMDLs for these waters, and develop IPs for the TMDLs. The VADEQ administers the TMDL process, including the public participation component, and formally submits the TMDLs to the EPA and the SWCB

for approval. The VADEQ is also responsible for implementing point source WLAs, assessing water quality across the state, and conducting water quality standard related actions.

Department of Mines, Minerals, and Energy – Division of Mined Land Reclamation

The DMLR presently regulates all of the land-disturbing, mining, and reclamation activities from coal-mining operations by issuing Coal Surface Mining Operation (CSMO) permits. The DMLR is delegated by the Federal Office of Surface Mining to administer the requirements of the Federal Surface Mining Control and Reclamation Act (SMCRA). Also, the EPA grants the DMLR the authority to administer the VPDES permit program under the Clean Water Act for the coal industry. To that end, the DMLR utilizes enforcement action under the Virginia Coal SMCRA and VPDES to effect compliance with the State Water Control Law.

Department of Mines, Minerals, and Energy – Division of Gas and Oil

The DGO's responsibilities include the regulation of the effects of gas and oil operations (both on and below the surface), issuance of permits, administration of client assistance programs, inspection of well sites and gathering pipelines, reclamation of abandoned well sites, protection of correlative rights, and promotion of resource conservation practices.

Permits are required for ground-disturbing geophysical exploration, exploration wells, development wells, and gathering pipelines. The DGO reviews applications that must address information on acreage to be disturbed, blasting activities, proposed new roads and existing access roads, erosion and sediment control plans, the design and operation of any pits, and the drilling and stimulating plan (including information on the water and constituents of the drilling fluids and management and disposal of pit fluids, produced waters, drill cuttings and solids).

The DGO reviews all applications and may place conditions on a permit or require the applicant to submit more information or amend the proposed operation plan to ensure that the operator will comply with the law and regulation. Applicants must post a bond to guarantee that money is available for site reclamation and plugging should the operator fail to perform the work. The operator may not begin site work until the DGO issues a permit. In order to ensure compliance with the Virginia Gas and Oil Act and Regulation, field staff from the DGO make routine inspections of well sites, gathering pipelines, facilities, and other permitted sites and activities. Frequency of inspection is determined by a priority system that categorizes each permitted site or

operation according to its level of activity or the stability of the associated disturbed area. For more information, visit the web site: http://www.dmme.virginia.gov/Dgo/Default.htm.

Virginia Department of Conservation and Recreation

The VADCR is authorized to administer Virginia's NPS pollution reduction programs in accordance with §10.1-104.1 of the Code of Virginia and §319 of the Clean Water Act. The EPA is requiring that much of the §319 grant monies be used for the development of TMDLs. Because of the magnitude of the NPS component in the TMDL process, the VADCR is a major participant in the TMDL process. The VADCR has a lead role in the development of IPs to address correction of NPS contributions to water quality impairments. The VADCR also provides available funding and technical support for the implementation of NPS components of IPs. The staff resources in VADCR's TMDL program focus primarily on providing technical assistance and funding to stakeholders to develop and carry out IPs, and supporting VADEQ in TMDL development related to NPS impacts. The VADCR staff will also be working with other state agencies, SWCDs, and watershed groups to gather support and to improve the implementation of TMDL plans through utilization of existing authorities and resources.

The Virginia Department of Forestry

Forests provide a vital role in preserving water quality. The VDOF inspects logging jobs to ensure that BMPs are being installed by loggers, because there is a zero tolerance for sedimentation in nearby streams. Effective July 1, 2002, Virginia's General Assembly made changes to the Silvicultural Water Quality Law, Code of Virginia §10.1-1181.2(H) related to Notification of the Commercial Harvesting of Timber. This change gives the State Forester the authority to issue a civil penalty of $250 for the initial violation and up to $1,000 for subsequent violations within a 24-month (2-year) period. The Notification is required by the Operator (as defined in the law) and the civil penalty will be assessed against the Operator for failure to notify. Notification must be received by the VDOF within three working days of the start of the logging operation, or before completion if the operation will take less than three days to finish. The Virginia DOF has the authority under the Code of Virginia to issue Special Orders to any owner or operator who has conducted or is allowing the conduct on any silvicultural activity in a manner which is causing or is likely to cause pollution, and to implement corrective measures within a stated period of time. Failure to obey a Special Order issued by the VDOF can result in

civil penalties of up to $5,000 per day. A *Best Management Practices Field Guide* is available at http://www.dof.state.va.us/wq/wq-bmp-guide.htm. Forestry BMPs are directed primarily to control erosion. For example, streamside forest buffers provide nutrient uptake and soil stabilization, which can benefit water quality by reducing the amount of nutrients and sediments that enter local streams (http://www.dof.state.va.us/resources/wq-BMP-Chapter-10.pdf).

The VDOF also has a major role in protecting watersheds through riparian forest buffers. Riparian forest buffers reduce erosion and cleanse water entering streams. These activities are allowed under the **Code of Virginia**: Water Quality Law, Chapter 11, 10.1-1181.7 (http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+10.1-1181.7).

Virginia Cooperative Extension

VCE is an educational outreach program of Virginia's land grant universities (Virginia Tech and Virginia State University), and a part of the national Cooperative State Research, Education, and Extension Service, an agency of the United States Department of Agriculture. VCE is a product of cooperation among local, state, and federal governments in partnership with citizens. VCE offers educational programs and technical resources for topics such as crops, grains, livestock, poultry, dairy, natural resources, and environmental management. VCE has published several publications that deal specifically with TMDLs. More information on these publications including the location of county extension offices is at http://www.ext.vt.edu/.

7.3 Local Government Agencies

Local government groups work closely with state and federal agencies throughout the TMDL process; these groups possess insights about their community that may help to ensure the success of TMDL implementation. These stakeholders have knowledge about a community's priorities, how decisions are made locally, and how the watershed's residents interact. Some local government groups and their roles in the TMDL process are listed below.

Soil and Water Conservation Districts

SWCDs are local units of government responsible for the soil and water conservation work within their boundaries. The role of these districts is to increase voluntary conservation practices among farmers, ranchers and other land users. District staff work closely with watershed

residents and have valuable knowledge of local watershed practices. The CVSWCD has agreed to house a VISTA volunteer in their offices to support this project.

Planning District Commissions (PDC)

PDCs were organized to promote the efficient development of the environment by assisting and encouraging local governmental agencies to plan for the future. PDCs focus much of their efforts on water quality planning which is complementary to the TMDL process. The Dumps Creek watershed falls in the Cumberland Plateau PDC. For more information on the Virginia PDCs, visit http://www.institute.virginia.edu/vapdc/.

County/City Government Departments

City and county government staff work closely with PDCs and state agencies to develop and implement TMDLs. They may also help to promote education and outreach to citizens, businesses and developers to introduce the importance of the TMDL process.

7.4 Businesses, Community Groups, and Citizens

While successful implementation depends on stakeholders taking responsibility for their role in the process, the primary role falls on the local groups that are most affected; *i.e.,* businesses, community watershed groups, and citizens.

Community Watershed Groups

Local watershed groups offer a meeting place for river groups to share ideas and coordinate preservation efforts and are also a showcase site for citizen action. Watershed groups also have a valuable knowledge of the local watershed and river habitat that is important to the implementation process.

Citizens and Businesses

The primary role of citizens and businesses is simply to get involved in the TMDL process. This may include participating in public meetings (Chapter 4), assisting with public outreach, providing input about the local watershed history, and/or implementing BMPs to help restore water quality.

Community Civic Groups

Community civic groups take on a wide range of community service including environmental projects. These groups include Ruritan, farm clubs, homeowners' associations, and youth organizations such as 4-H and Future Farmers of America. Groups such as these can assist in the public participation process and educational outreach, and assist with implementation activities in local watersheds.

The benefits of involving the public in the implementation process are potentially very rewarding, but the process of doing so can be incredibly challenging. It is, therefore, the primary responsibility of these stakeholder groups to work with the various state agencies to encourage public participation and assure broad representation and objectivity throughout the implementation process.

7.5 Monitoring

The VADEQ will continue monitoring the existing station in the Dumps Creek watershed (Figure 7.1). The two stations identified represent ambient monitoring (DUM000.04) and biological monitoring (DUM001.09). In addition, DMME will continue to require monitoring in support of permitting activities. This monitoring effort will vary as permits change.

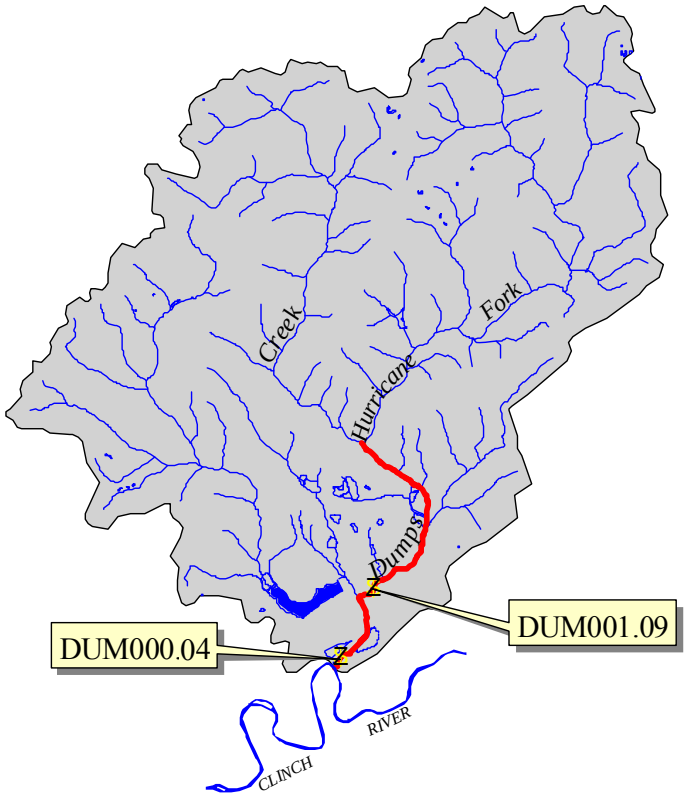

Figure 7.1 Location of monitoring stations in the Dumps Creek watershed.

8. FUNDING

It is anticipated that most of the remediation efforts outlined in this proposal will be funded by industry interested in re-mining AML sites, or remediating AML sites in order to gain mitigation credits to offset disturbances elsewhere in the watershed. However, the following examples of funding opportunities are presented as possible alternative funding sources.

Federal Clean Water Act 319 Incremental Funds

Through Section 319 of the Federal Clean Water Act, Virginia is awarded grant funds to implement the nonpoint source programs. VADCR administers the money in coordination with the Nonpoint Source Advisory Committee (NPSAC) to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and technical and program staff. VADCR reports annually to the EPA on the progress made in nonpoint source pollution prevention and control. A 319 application will be written upon completion of the IP to request funding for the technical assistance required (FTEs).

Virginia Small Business Environmental Assistance Fund Loan Program

The Fund, administered through VADEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. The equipment must be needed by the small business to comply with the federal Clean Air Act, or it will allow the small business to implement voluntary pollution prevention measures. The loans are available in amounts up to $50,000 and will carry an interest rate of 3%, with favorable repayment terms based on the borrower's ability to repay and the useful life of the equipment being purchased or the life of the BMP being implemented. There is a $30 non-refundable application processing fee. The Fund will not be used to make loans to small businesses for the purchase and installation of equipment needed to comply with an enforcement action. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

National Fish and Wildlife Foundation

Offers are accepted throughout the year and processed during fixed signup periods. The signup periods are on a year-round, revolving basis, and there are two decision cycles per year. Each

cycle consists of a pre-proposal evaluation, a full proposal evaluation, and a Board of Directors' decision. An approved pre-proposal is a pre-requisite to the submittal of the full proposal. Grants generally range between $10,000 and $150,000. Payments are based on need. Projects are funded in the U.S. and any international areas that host migratory wildlife from the U.S. Grants are awarded for the purpose of conserving fish, wildlife, plants, and their habitats. Special grant programs are listed and described on the NFWF website (http://www.nfwf.org). If the project does not fall into the criteria of any special grant programs, the proposal may be submitted as a general grant if it falls under the following guidelines: 1) it promotes fish, wildlife and habitat conservation, 2) it involves other conservation and community interests, 3) it leverages available funding, and 4) project outcomes are evaluated. A pre-proposal that is not accepted by a special grant program may be deferred to the general grant program.

Clean Water State Revolving Fund

EPA awards grants to states to capitalize their Clean Water State Revolving Funds (CWSRFs). The states, through the CWSRF, make loans for high-priority water quality activities. As loan recipients make payments back into the fund, money is available for new loans to be issued to other recipients. Eligible projects include point source, nonpoint source and estuary protection projects. Point source projects typically include building wastewater treatment facilities, combined sewer overflow and sanitary sewer overflow correction, urban stormwater control, and water quality aspects of landfill projects. Nonpoint source projects include agricultural, silvicultural, rural, and some urban runoff control; on-site wastewater disposal systems (septic tanks); land conservation and riparian buffers; leaking underground storage tank remediation, etc. Estuary protection projects include all of the above point and nonpoint source projects, as well as habitat restoration and other unique estuary projects.

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